

Reverb Granules Visualization

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1 Overview

This document describes work to be performed as part of EED Task 2 Revision 4. Specific enhancements have been requested to add capabilities to Reverb so that it will support image browsing for granules with associated browse imagery. Users will be able to select granules through their associated imagery as an additional mechanism for moving items into and out of the Reverb shopping cart. These enhancements are categorized under the heading "Image View."

Additionally, users will be able to select groups of granules temporally by supplying a set date/time range. Users can adjust the range through UI controls and view granule imagery across datasets. These enhancements are categorized under the heading "Timeline View."

2 Image View

Image View is a component of visualization referring to a user's ability to see associated browse imagery for a collection of granules through a photo-viewing style interface (see Figure 1).

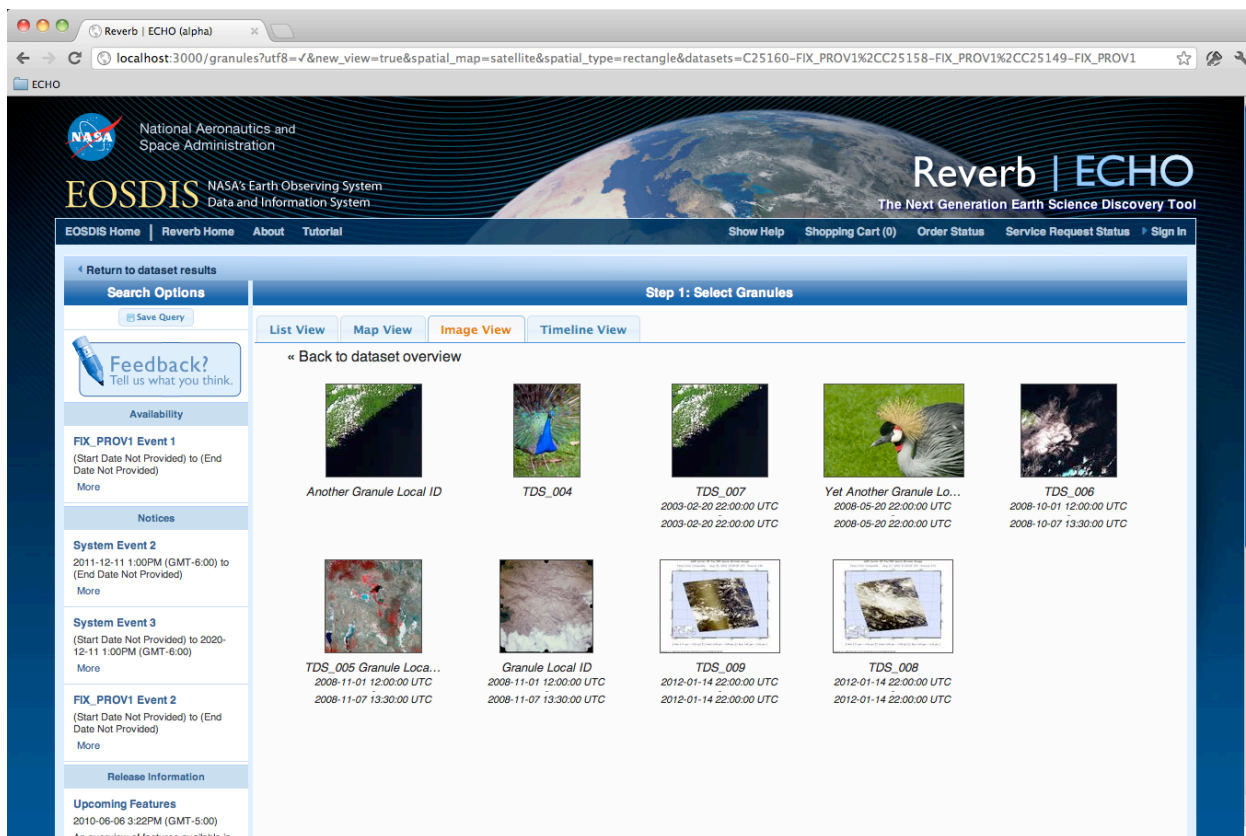


Figure 1: Sample Dataset examined via Image View

The images are laid out on a grid and are individually selectable. A user can add and remove a granule through its image directly, rather than having to return to granule results. Additionally, users see thumbnail versions of each granule's images through a "grid" from which they can organize and view larger versions of each granule's imagery.

2.1 Background

EED Task 2 Revision 4 contains the following requirements related to Image View:

1. A Reverb user should be able to view images associated with a granule (including the case when one granule has multiple browse images).
2. A Reverb user should be able to view multiple images (from a single granule or from multiple granules within a single dataset) side by side, or at least on the same screen.
3. A Reverb user should be able to view a granule's associated imagery in a large (close to full-screen) size.
4. A Reverb user should be able to add and remove granules from their cart through that granule's associated imagery without returning to a different tab or screen.

2.2 Proposed Changes

In response to these requirements, we have identified the following modifications to the ECHO system as part of the Image View mechanism:

1. Add an additional "Image View" tab to the granule results page.
2. Under "Image View," display a thumbnail-sized version of each granule's associated browse image. Supply the image's granule UR (or local ID, as appropriate) and metadata under each image.
3. Link each thumbnail image to a full-sized popup version of the image.
4. Add an "Add to Cart" button overlay to each thumbnail image for easy ordering.
5. Add an "Information" button overlay to each thumbnail image for accessing granule details for that image.

2.3 User Interface Mockups

The Image View tab is an additional tab provided on the existing Reverb granule results page, as shown in Figure 2. Users can click on a dataset to see all of the granule imagery for that dataset.

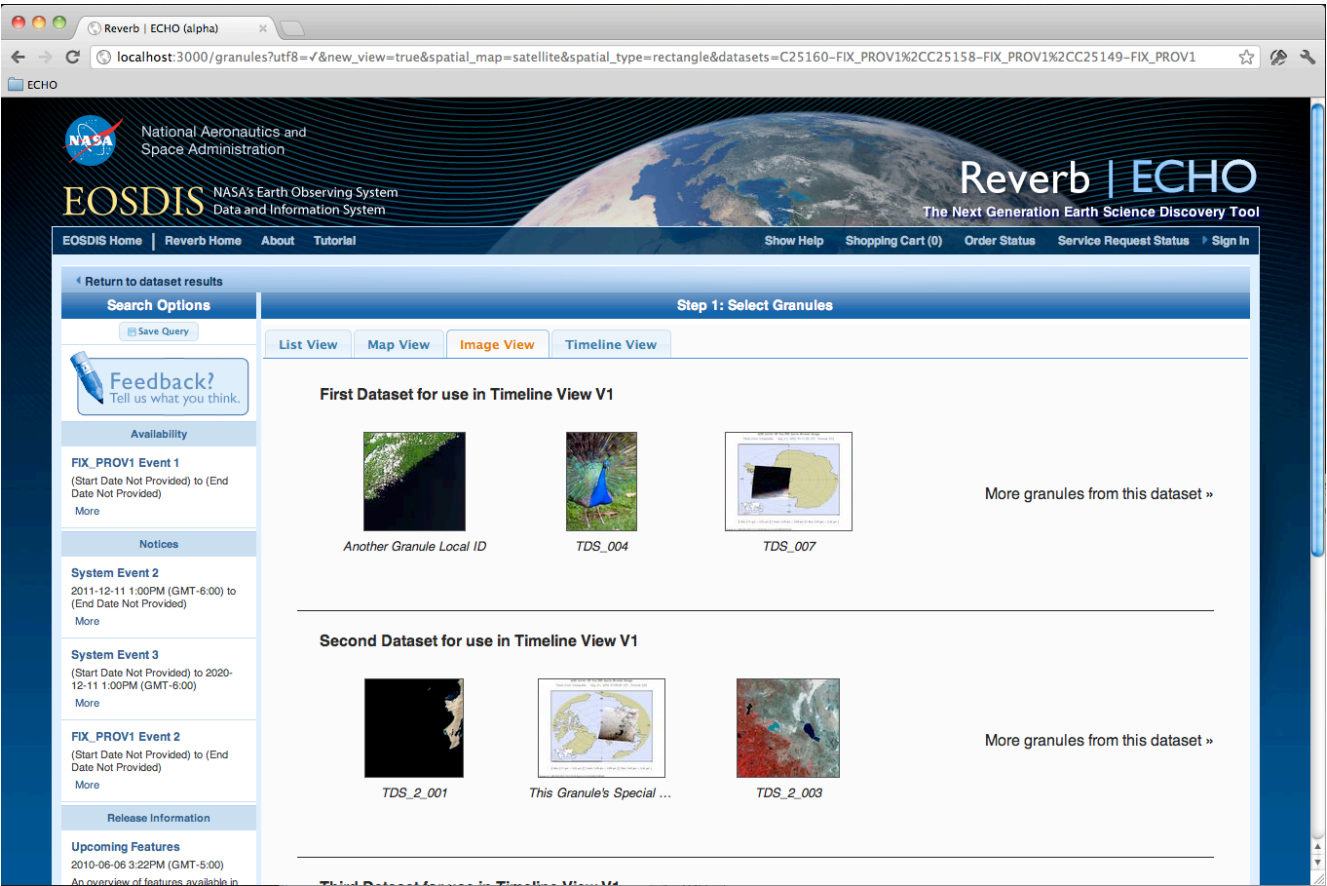


Figure 2: Initial dataset view with "More granules from this dataset >>" links

Once a dataset is selected, each granule within that dataset that has associated browse imagery has its images displayed in a grid, in a smaller thumbnail format (see Figure 3).

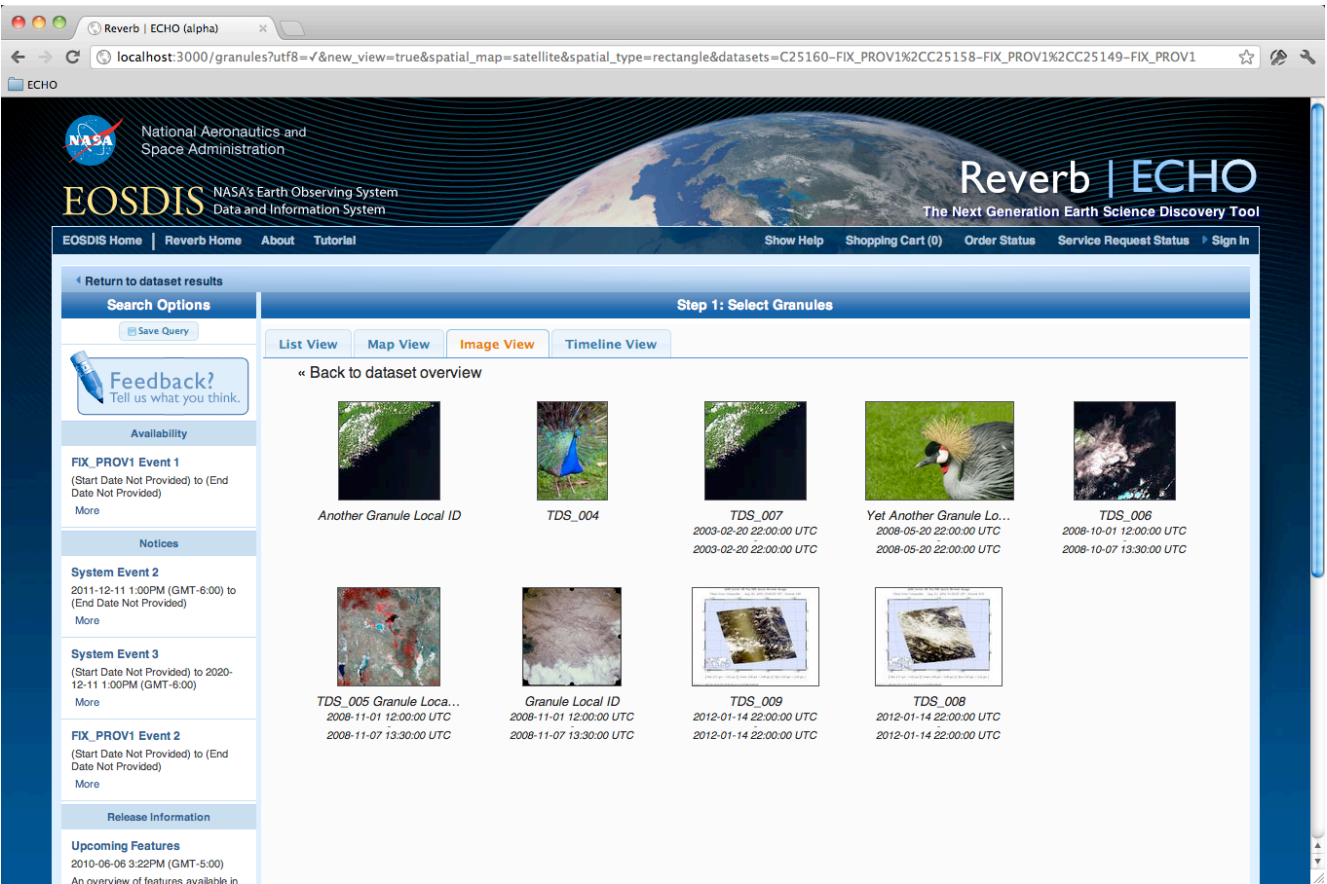


Figure 3: A selected dataset within Image view tab showing thumbnail images

Users can quickly scan each granule via the granule imagery and add granules to their cart via overlay buttons (shown in Figure 4). These overlay buttons are shown when hovering the mouse over a granule's thumbnail image; the buttons disappear when the mouse is moved away from the thumbnail image.

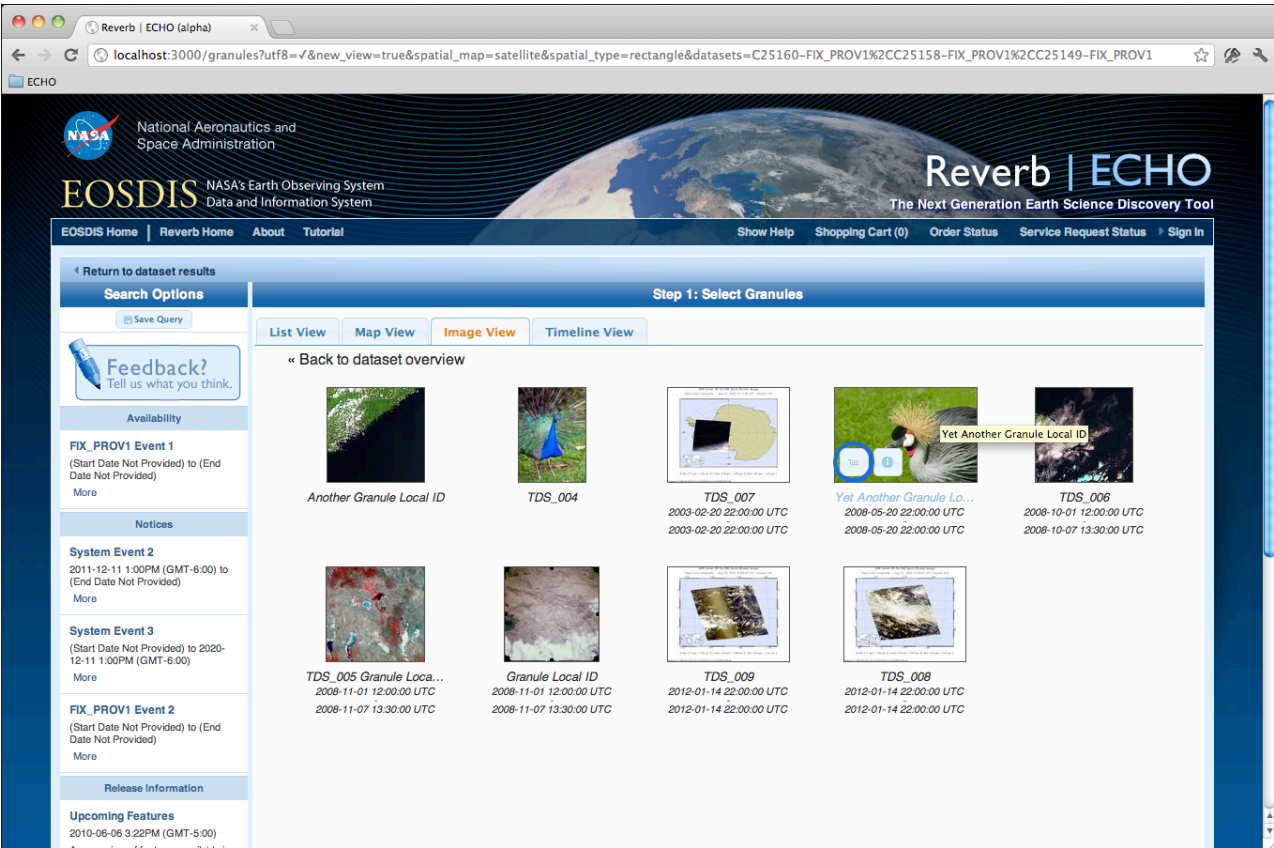


Figure 4: "Add to Cart" and "Information" buttons appear when hovering over a thumbnail image

Hovering over a thumbnail image also displays an “Information” button (also shown above in Figure 4) that can be clicked. This button opens a popup with additional granule information, similar to the “Information” button on the “List View” tab. Figure 5 shows this popup.

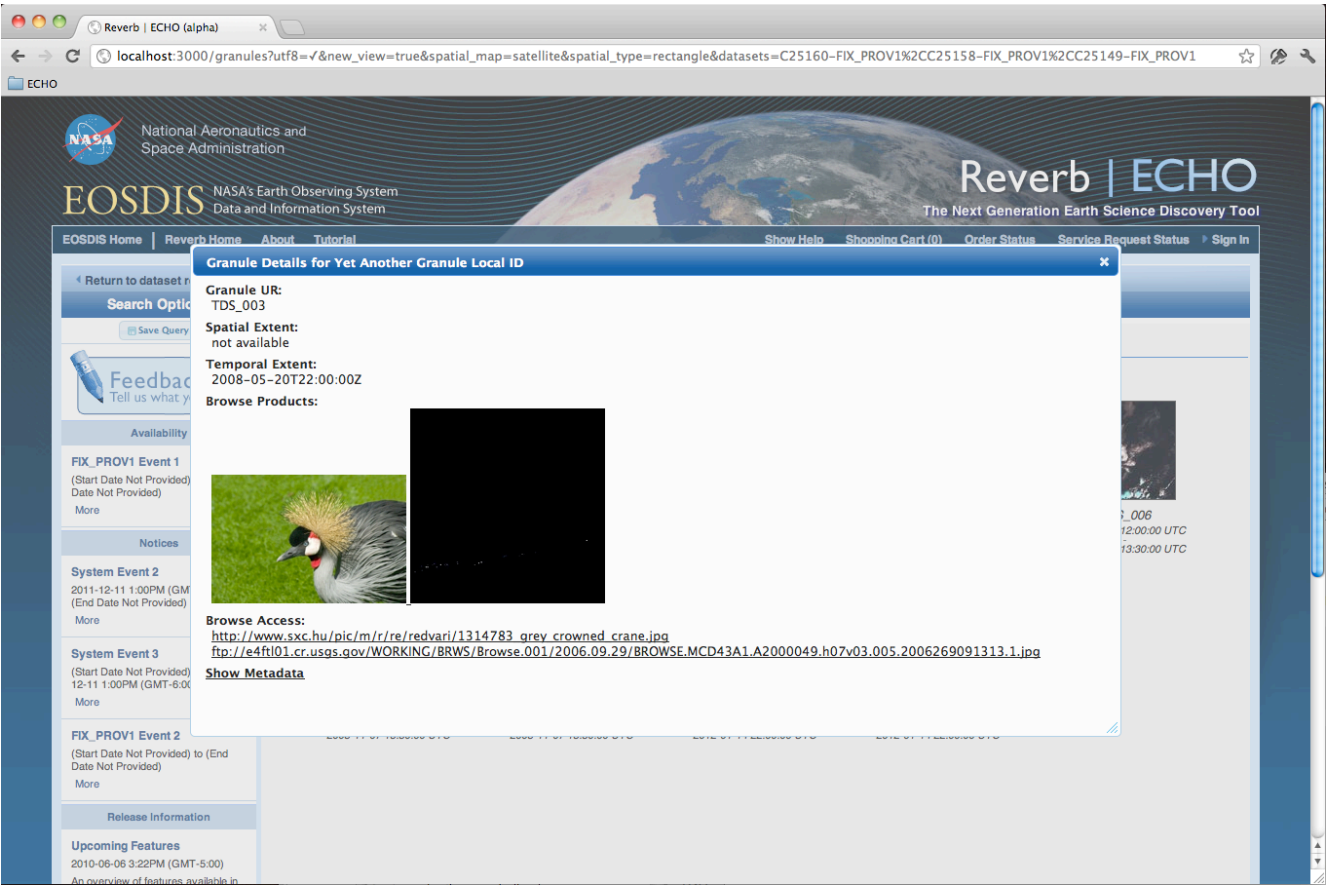


Figure 5: The "Information" button shows details about the image's associated granule.

While each image can be viewed in thumbnail, it is also possible to view the images in more detail. Clicking on an image loads that image in a popup window at a larger size, as shown in Figure 6. Although not shown in this user interface mockup, this larger popup view will also include additional metadata about the granule associated with the selected image.

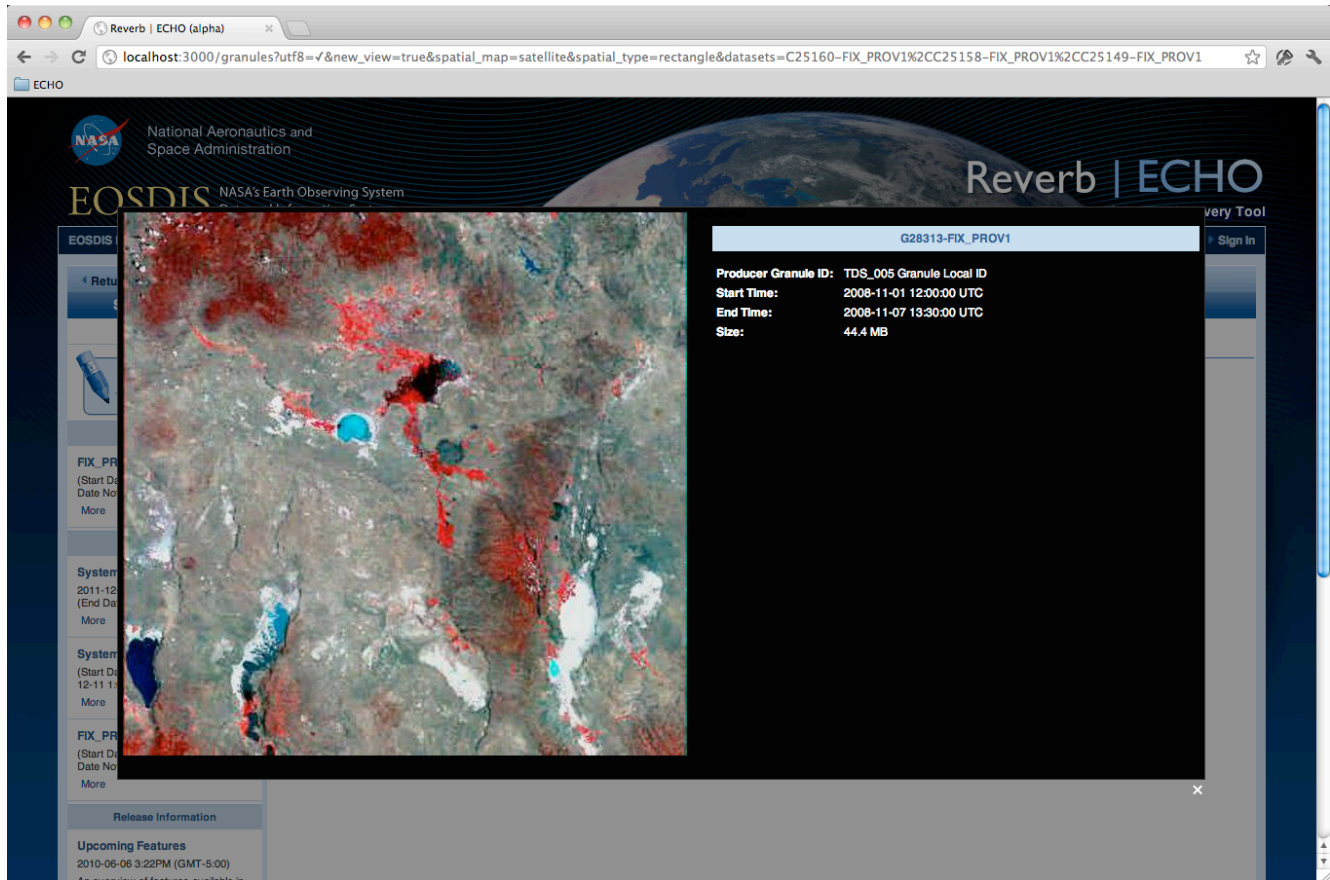


Figure 6: Each image can be seen "close-up" through clicking on the image's thumbnail.

2.4 Assumptions

Image View assumes the following technical capabilities exist either within Reverb or Reverb-accessible APIs:

1. Reverb can retrieve a granule's associated browse imagery via granule ID.
2. Reverb can retrieve that image in a standard format (e.g. JPG) with a standard extension (e.g. *.jpeg*).
3. Reverb can request a standardized thumbnail size version of an image (e.g. 100x100).
4. Reverb can request a standardized "full" size version of an image (e.g. 800x800), suitable for display in and on a Reverb-baseline browser and screen.
5. Reverb can retrieve multiple individual images (according to assumptions above) from a single HDF resource.

6. Reverb users are satisfied seeing a single image associated with a granule in Image View when that granule has multiple associated images. Viewing multiple images is accomplished through the Information popup accessed through the Information button.
7. Image retrieval (see #1 through #5) is reasonably fast, according to acceptable Reverb performance requirements.

3 Timeline View

Timeline View provides an interactive tool to aid in selecting individual and groups of granules. However, the focus on this view is selecting groups of granules based upon a temporal range. A timeline is a linear range from one point in time to another, and granules (represented via cross hatches or colored rectangles) are laid along that timeline, both sequentially and proportionally. This view also allows for a cross-dataset view along the same timeline, so that granules' temporal position in one dataset can be seen against another dataset's granules—all on a single scale and temporal range (see Figure 7).

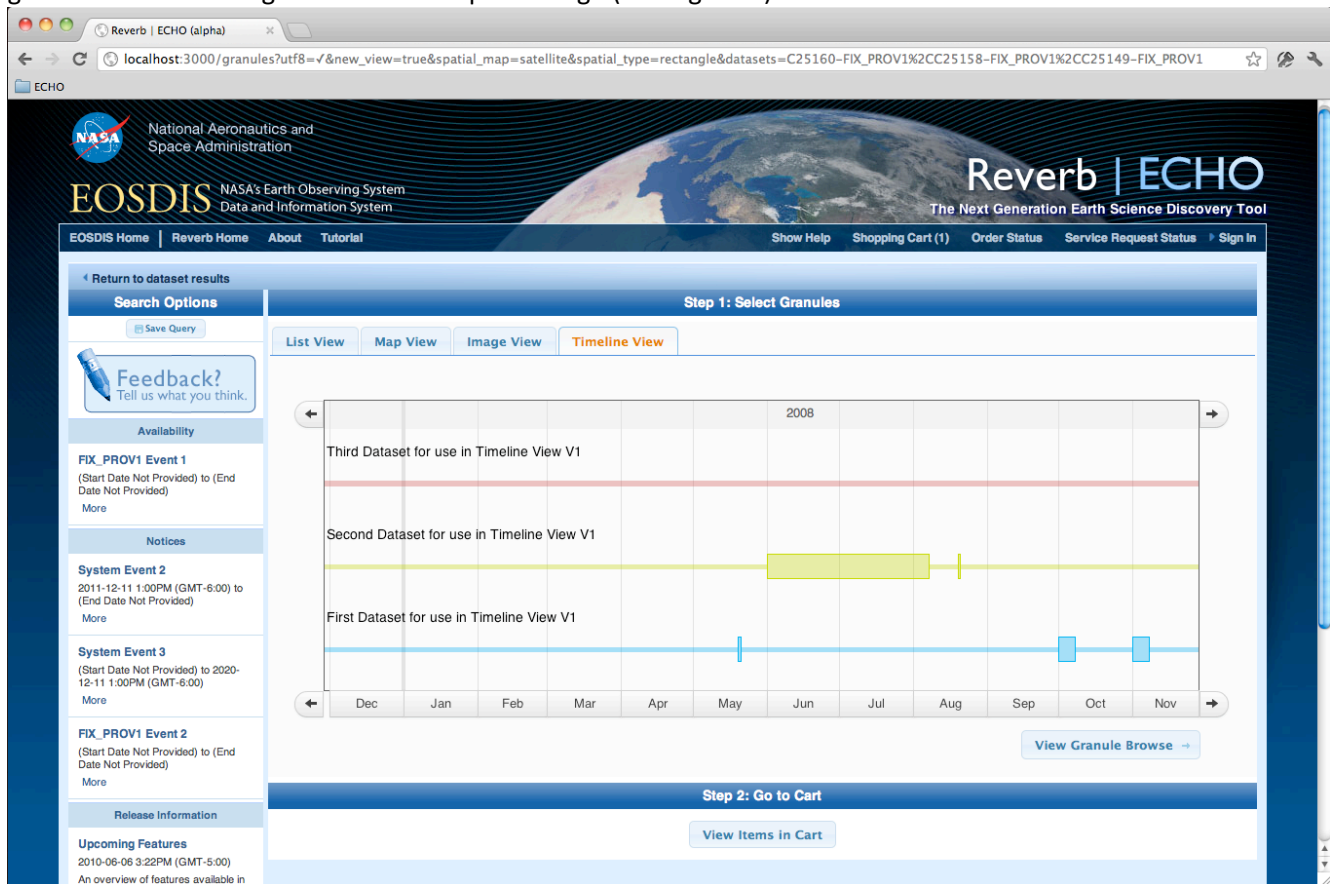


Figure 7: Sample visualization of three datasets via Timeline View

The purpose of this view is to allow granule selection for further processing, rather than individual or group granule viewing. Granules chosen via the Timeline View can then be further explored with the "View Granule Browse" selection button.

3.1 Background

EED Task 2 Revision 4 contains the following requirements related to Timeline View:

1. A Reverb user should be able to select a "Timeline View" tab from the granule results page and have their currently matched datasets and granules display on that tab.
2. A Reverb user should be able to select a temporal range, with a start date/time (with hour precision) and an ending date/time (with minute precision). If the user has already entered a temporal range into their granule search criteria on the Reverb home page, that range is the initial range used for Timeline View¹.
3. A Reverb user should be able to see a timeline, scoped to their temporal range from #2, with all selected datasets shown on that timeline. Each dataset should get its own vertical "line" but appear on the same timeline.
4. A Reverb user should be able to see granules laid out visually along the timeline, with an icon or mini-image representing a granule on the timeline. Single-date/time granules are shown as hatches along the timeline; granules with longer ranges are shown as rectangles (refer to Figure 7 and Section 3.3: User Interface Mockups).

3.2 Proposed Changes

In response to these requirements, we have identified the following modifications to the Reverb as part of the Timeline View mechanism:

1. Add an additional "Timeline View" tab to the granule results page.
2. Display a horizontal "timeline" with hash marks to indicate major divisions of time, determined by the overall temporal range length (with a maximum range of one year).
3. Display each dataset on the timeline in its own horizontal space, but sharing the timeline's range and scale. All datasets on the tab will also share the same temporal range and divisions, as well as being lined up with the other datasets.
4. Each dataset's granules will be displayed above the timeline by showing a graphical "icon" or "shape" for that granule.
 - a. A granule with a single date/time will be shown as a single vertical line on its dataset's horizontal line along the timeline.

¹ There are certain ranges that are difficult to show in a usable manner. For temporal ranges greater than a year in length, the selected range is shown a year at a time, beginning at the first year selected. For ranges less than a day, an entire day is shown.

- b. A granule with a range (start date/time and end date/time) will be shown as a rectangle on its datasets horizontal line along the timeline.
 - c. Multiple granules within a single dataset that share a single date/time or range will be condensed into a single vertical line (for single date/times) or a single rectangle (for a ranged date/time).
- 5. The temporal range can be adjusted and the timeline redrawn at any time without leaving the "Timeline View" tab. There will be controls to change:
 - a. The selected month, day, and year through selection boxes.
 - b. The previous and next "large-scale" unit (day, month, etc.)
 - c. The previous and next "small-scale" unit (hour)
- 6. Add a "View Granule Browse" button that launches the Image View tab (see Section 2) with only the granules currently visible on the timeline as a "sub selection." Those granules can then be viewed, added to the cart, etc., through the Image View interface.

3.3 User Interface Mockups

The Timeline View tab is an additional tab provided on the existing Reverb granule results page, as shown in Figure 8.

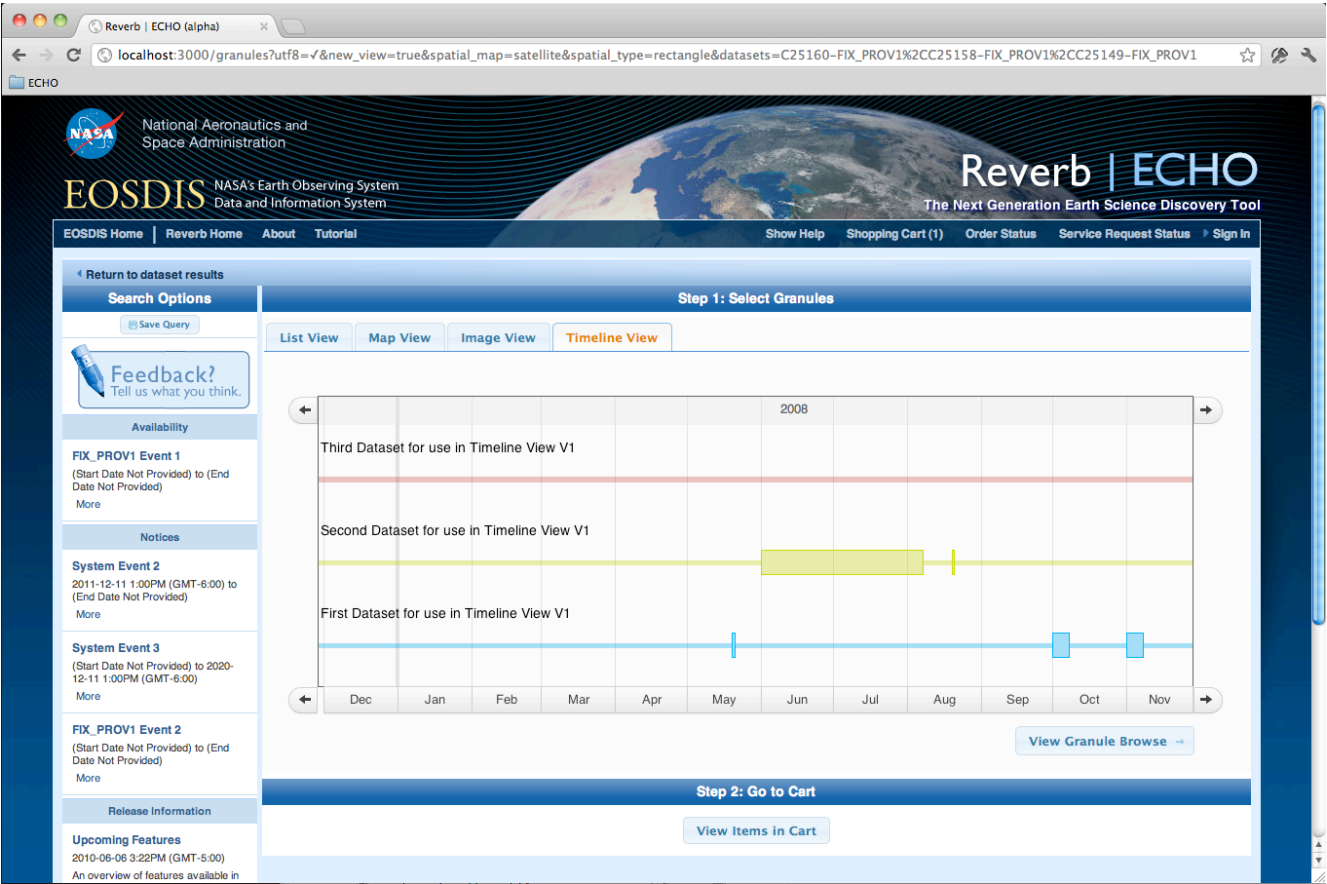


Figure 8: Initial Timeline View with three datasets visible

The selected datasets are visible on a timeline with a default range, or any previously specified date range. Each dataset's granules are displayed via a rectangle, either located on the granule's single date/time, or stretched across a granule's date/time range. Figure 9 shows three datasets in timeline view, with various granules visible.

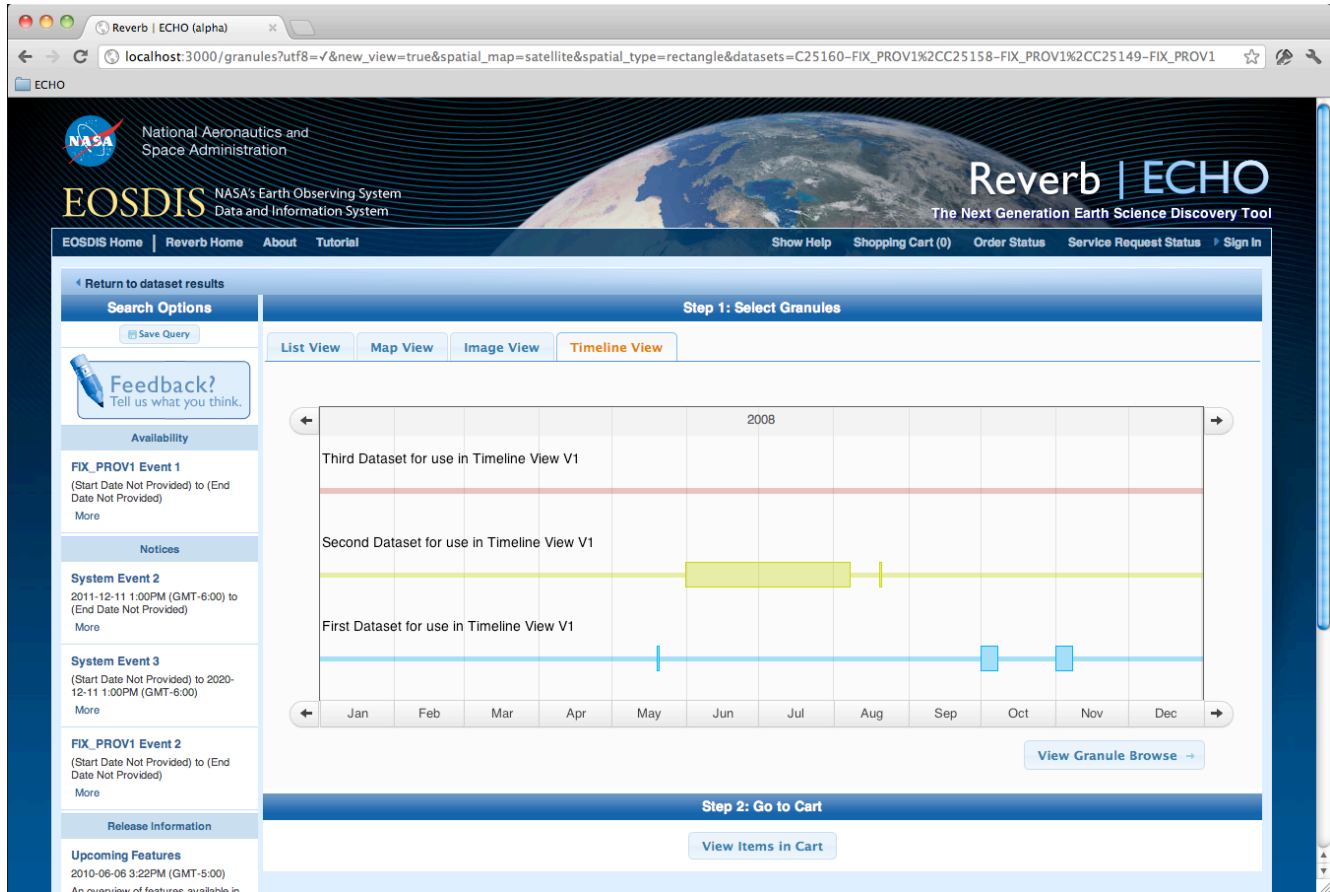


Figure 9: Granules are spaced out on the timeline proportionate to the overall temporal range

A larger rectangle indicates contiguous data. In the case where there is a single date/time for a granule, the zooming determines how that granule's rectangle appears. With larger scales (e.g. an entire year in view), the granule's rectangle may appear as a thin line (see Figure 10). When zoomed in closer (day or hour view), that same granule's rectangle appears wider (see Figure 11).

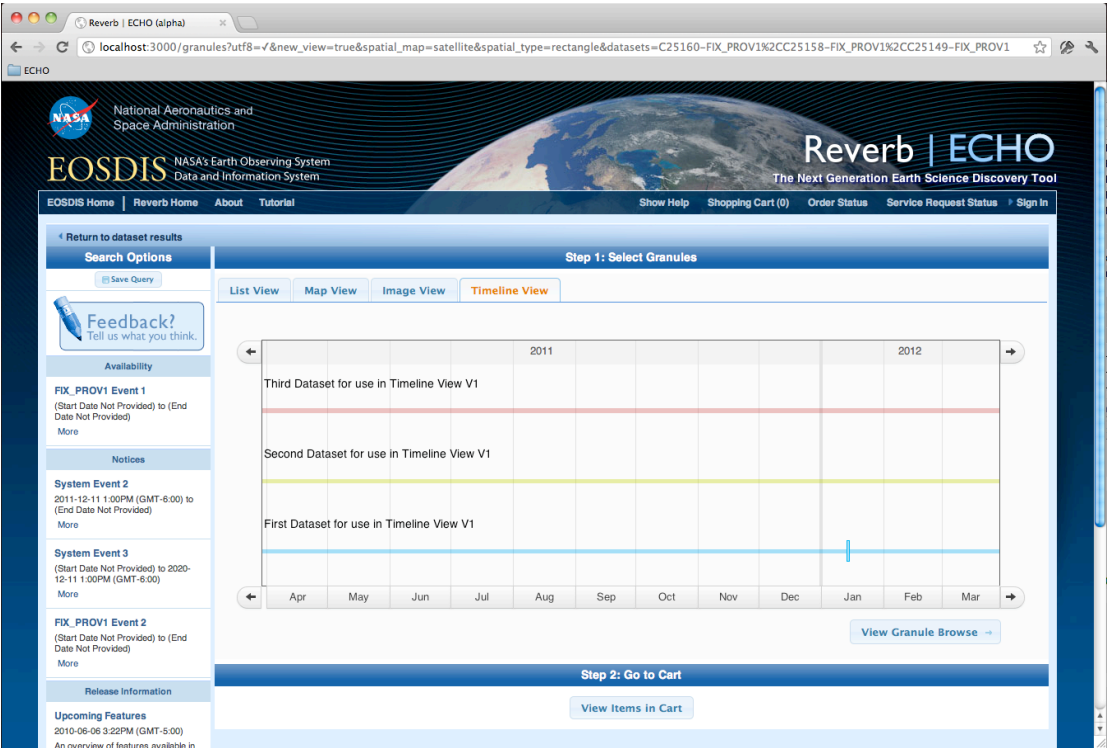


Figure 10: A single vertical line is shown for granules in January of 2012 at a smaller resolution (year view)

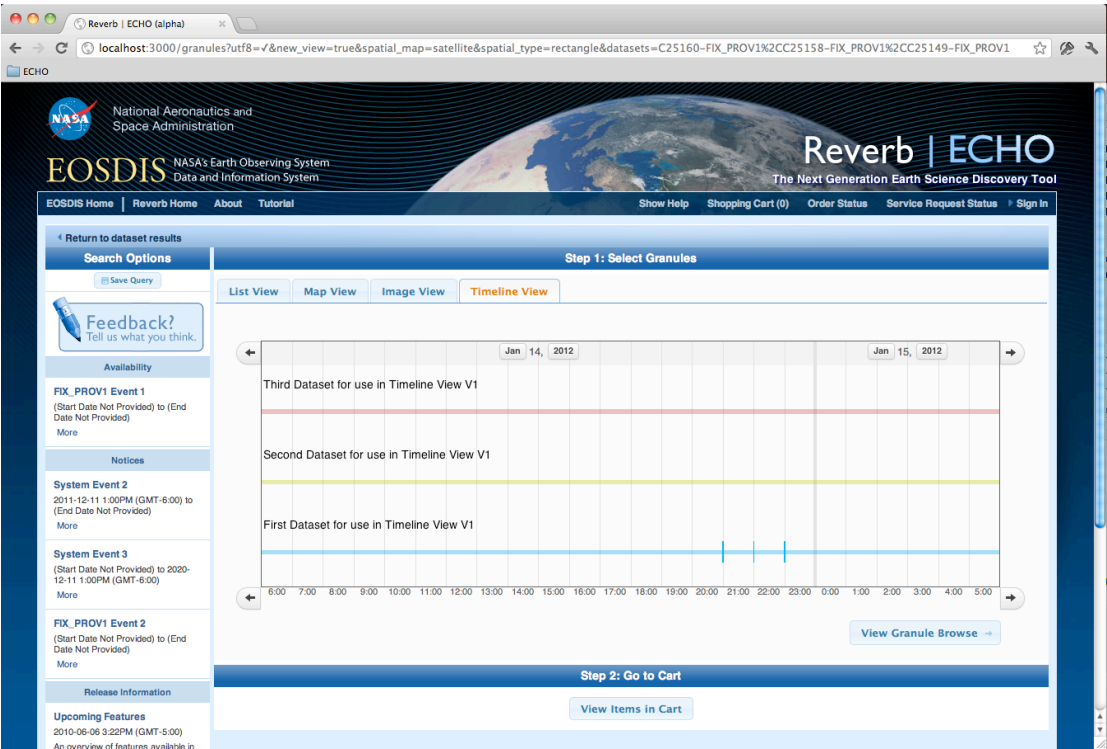


Figure 11: At a larger resolution (hour view) that single line is shown as three individual granule lines

Once the timeline has been scoped as the user desires, they can press the "View Granule Browse" button to select just the granules on the timeline for further inspection via Image View (see Section 2). Figure 12 shows a selection of granules via Timeline View.

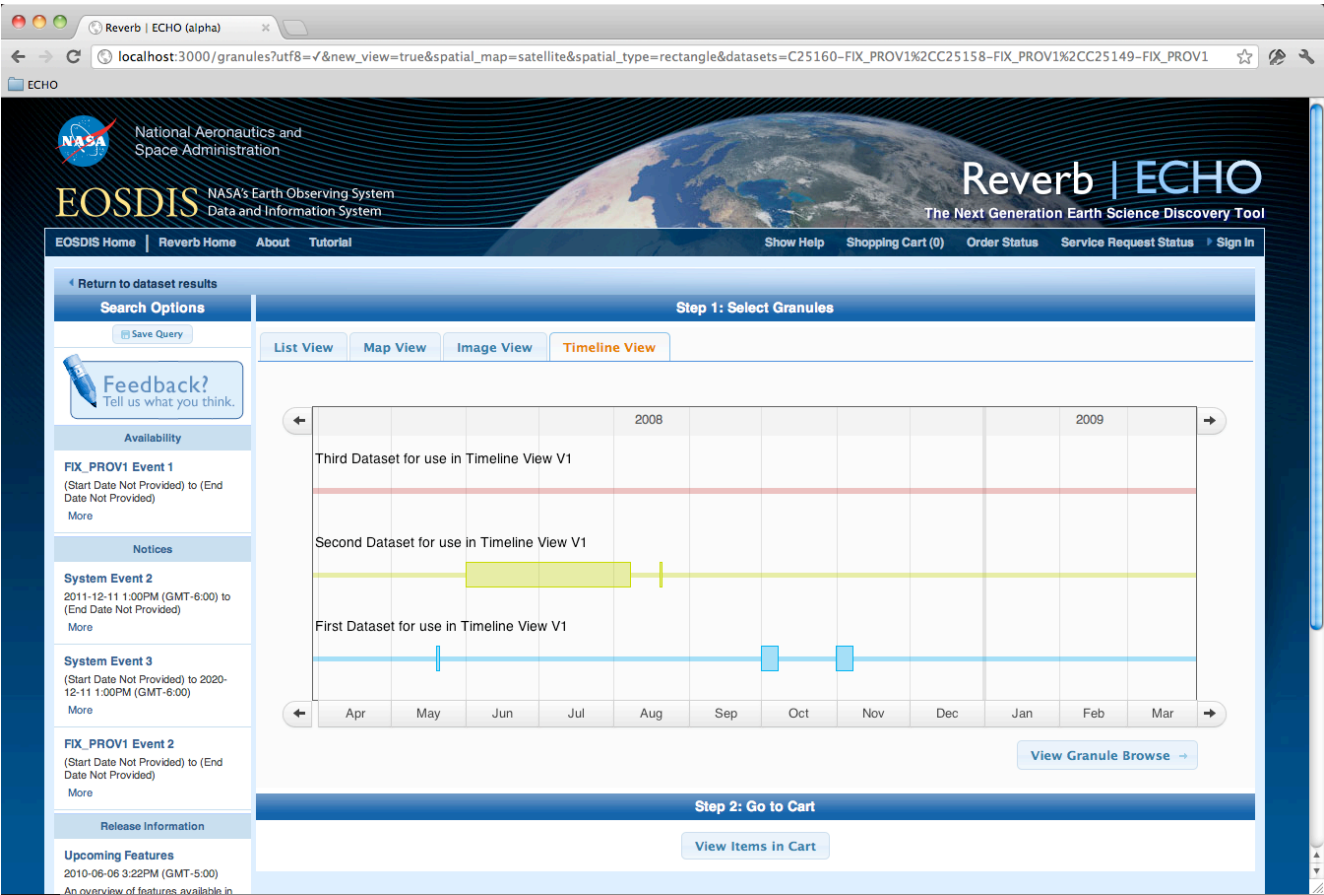


Figure 12: This range covers April 2008 through March 2009, across three datasets

Figure 13 shows the results of pressing "View Granule Browse": a selection of granules (which excludes granules outside of the previous timeline's scope) viewed in Image View.

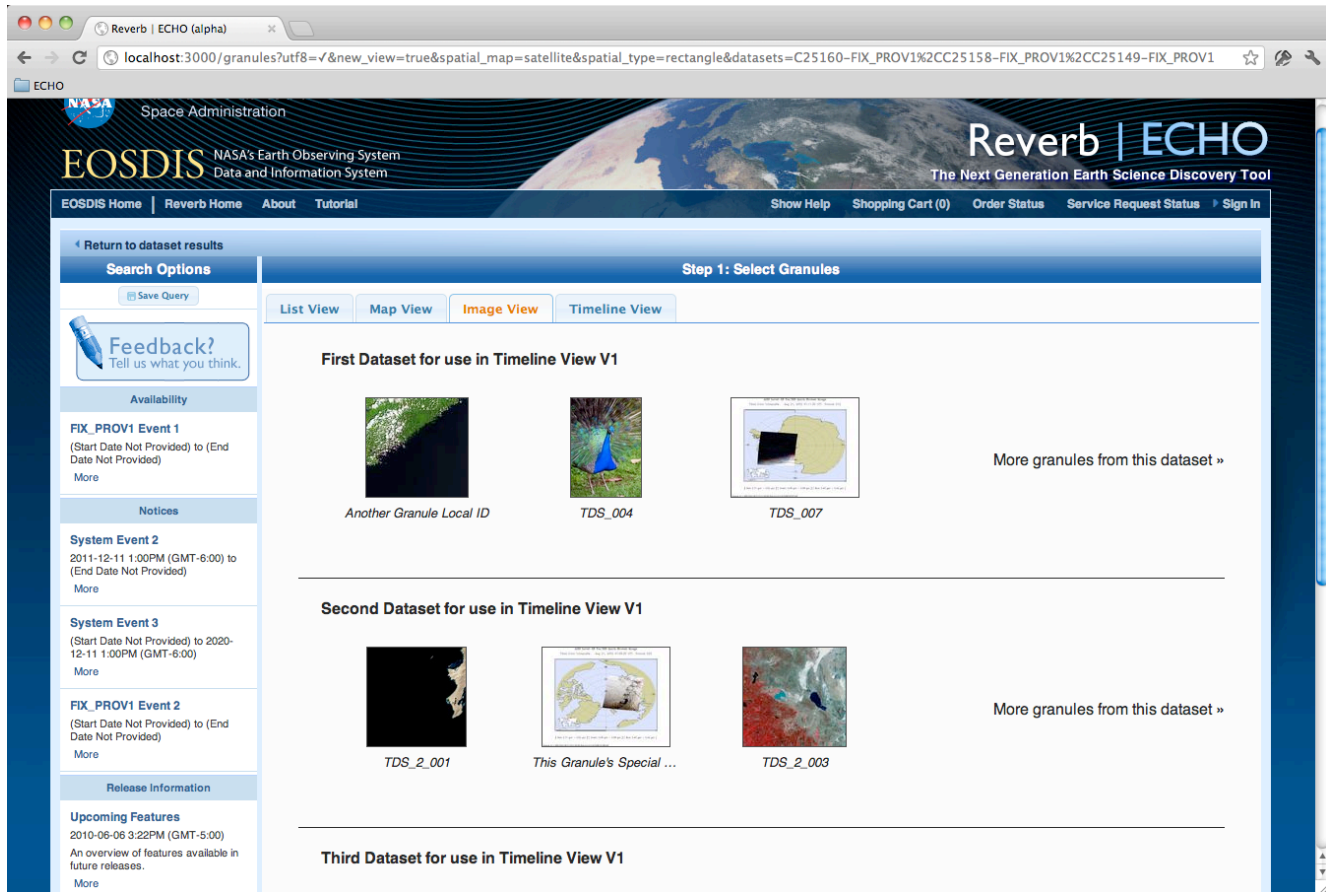


Figure 13: Only the granules shown on the timeline (see Figure 12) appear in this Image View

3.4 Rules Covering Timeline Ranges

The following rules determine the initial range displayed via Timeline View:

1. If the user specified a temporal constraint on the home page, that constraint becomes default timeline selection.
2. If the user selects a (different) temporal range on the timeline, that becomes the new temporal constraint for all granule searches. The granule pages will behave as though you had selected that temporal range on the home page. The new constraint appears in the sidebar.
3. When the user first visits the timeline, the user's temporal constraint is shaded blue (if present) and the visible time range is set to:
 - a. 1 year ending at the present time, if the user did not select any temporal constraints for the search.
 - b. 1 year beginning at the user's selected temporal constraint, if the user selected a constraint longer than 1 year.

- c. 1 day centered around the user's selected temporal constraint, if the user selected a constraint shorter than 1 day.
- d. The user's selected temporal constraint, if it is longer than a day but shorter than a year.

3.5 Assumptions

Image View assumes the following technical capabilities existing within Reverb:

1. Reverb has all of the image retrieval and scaling capabilities detailed in Section 2.4.
2. Reverb granules have a valid date association, or that granules without an associated date are not displayed on the timeline.

3. Datasets with very large numbers of granules grouped within a very small temporal range may not display in a very usable fashion. The user will need to make good temporal range choices to make the best use of the Timeline View.

Date	Version	Brief Description
01/23/2012	010	Initial Internal Draft
01/24/2012	020	Added Timeline Visualization
01/25/2012	030	Incorporated feedback from Dan Pilone, Matt Cechini, and Patrick Quinn. Added UI mockups for Timeline View
02/05/2012	040	Updated Timeline and Image View screenshots to reflect Reverb visualization prototype work
03/28/2012	050	Updated entire document to reflect merged Timeline and Image View, per Reverb 10.44.10
04/02/2012	060	Revisions based on feedback from 050.

Table 1 - Document Revision History